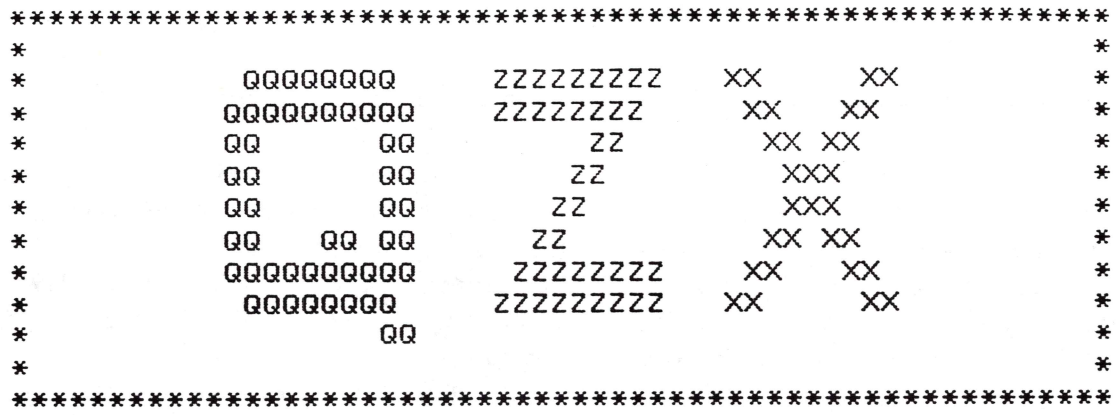
QQQQQQQ ZZZZZZZZZ XX XX
QQQQQQQQQQ ZZZZZZZZ XX XX
QQ QQ ZZ XX XX
QQ QQ ZZ XXX
QQ QQ ZZ XXX
QQ QQ QQ ZZ XX XX
QQQQQQQQQQ ZZZZZZZZ XX XX
QQQQQQQ ZZZZZZZZZ XX XX
QQ

The Journal Covering Amateur Radio & Sinclair Computers
ZX80; Micro-Ace; ZX81; TS1000, 1500, & 2068; QL; Z88

Alex. F. Burr, K5XY, Publisher
2025 O'Donnell Drive
Las Cruces, New Mexico
88001

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EDITOR'S NOTES

K5XY

Well, the printer did it again. I got yet another price for doing the August issue. (That sentence sure looks familiar.) But this time they did correct a few mistakes which I had made so they did not get into the final product.

Speaking of mistakes, the timing article for the TS2068 which was promised in the Editor's Notes last month did not make it into that issue. It made it into this issue.

I received a nice note from K V3Q, Bob Diggs. He described one of his activities which helps both the ham and the Sinclair world. He belongs to CATS, the Capital Area Timex/Sinclair Users Group, one of the best and most active groups in the country. At one of their recent meetings he demonstrated the use of the QL to receive packet over the air. He will give these people additional exposure to amateur radio in September when that club will meet at his house for a picnic.

The Sinclair scene is still active and growing in some areas. I just received an advertisement for a new newsletter for the Z88. The distinctive feature of this newsletter is that it is sent monthly by fax. (From Wyoming too, the location of other commercial Sinclair activity.)

In the mail today came two notes of appreciation for QZX. That does not happen very often but it is encouraging. A. Nieuwenhoff said he liked the listing of "Optical Horizon". It is not often that anybody mentions a specific short program. In this issue is another short listing, with more planned for the future. These programs come courtesy of WA3QLW.

QZX FRIENDS

WA3QLW -- Leslie renewed from Colorado and sent a long list of TS computers and programs which she is trying to sell. More importantly, she sent several relevent short programs which will be passed on in coming issues.

W4FCJ -- Buford writes about his use of his TS1000 and TS2068. The former is used with the NRAP program on RTTY. It has been extensively modified with a new keyboard and 64 K of internal RAM. It has been operated for about two years with no hardware failures. The NRAP program is kept on a Hunter board. The TS2068 is used with a RGB monitor for packet and satellite tracking.

K V3Q -- Bob has three QL's (one used for spare parts) which he has networked in a packet setup. He has a Teac disk drive on one QL and uses a MFJ 1278B TNC, ICOM 2AT, and a colinear antenna up about 15 feet.

WA6OUC -- Warren renewed and sent a contribution to the postage fund.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

QZX Discount: 15% discount on all orders mentioning QZX. T & C Services (address in ad in this issue).

FOR SALE: TS1000 + KBD for $25. Many cheap programs. Much more. SASE for list. WA3QLW, Box 821, Trinidad, CO 81082.

MAKING THE 1000/ZX81 EVEN BETTER

by Malcolm Post

Those of you reading this article who are users of the ZX-81 must be the world's most patient people or are already using some of the improvements on your computer.

The ZX-81 was designed to be marketed as an entry-level computer. Thus, the small memory, the use of a TV for a display and the use of a portable, monophonic tape recorder for permanent storage. Many optional add ons are available to the owner who wishes to go beyond the minimal machine. The use of a TV was a reasonable decision because of the relatively high price of a monitor. But, by letting the owner use any tape recorder available, Sinclair lost control of the quality of the resulting system. The tape I/O had to be made slow in order to acheive any degree of reliability.

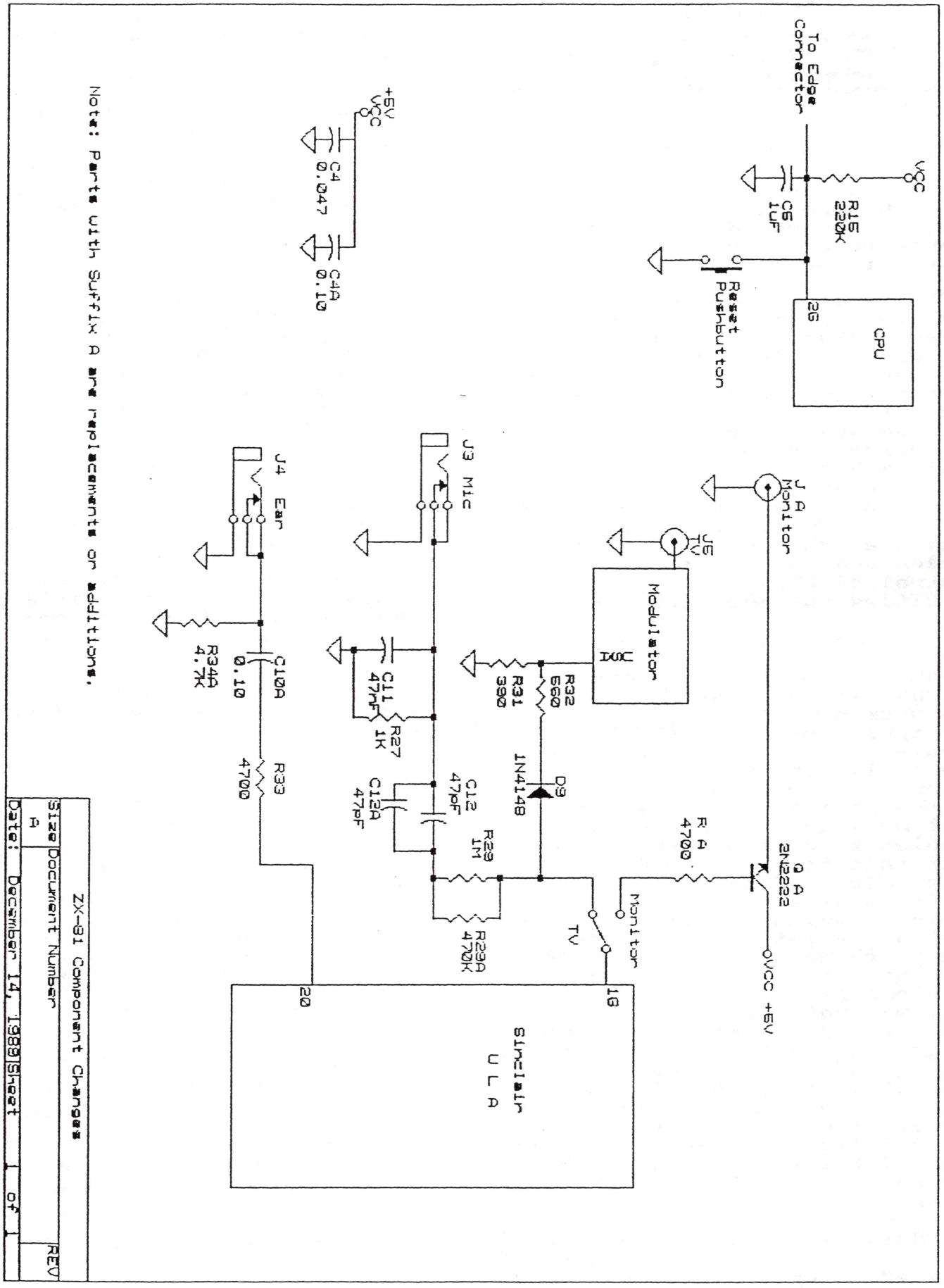
When I first tried my computer, I read all the instructions in the user manual and those suggestions provided with the commercial programs. When loading the small programs into a 2K memory, there were few problems. As the programs got larger, to fill my add-on, 16K memory, the problem frequency increased. About this time,I joined the computer club and many helpful suggestions were received. I tried various volume settings, tone control variations, removing the "ear" connection when LOADing and the "mic" when SAVEing, but problems persisted. Head alignment was not the problem, either because I could read commercial tapes much better than those I had written. This was my first productive clue towards solving the problems. By examining the output of commercial tapes with an oscilloscope and comparing them with the tapes written by the computer, a nice pattern of square waves showed from the commercial tape with higher amplitudes, versus distorted square waves with much electrical "noise" on the home-grown versions. In an effort to get a high enough amplitude from a weak signal, I was amplifying the noise, as well. Referring to Fig.1 on the next page, the solution was to reduce the resistance of R29 by parallelling it with R29A and adding C12A across C12. These changes permitted me to record at a lower level,where distortion was less and the square wave signal was much larger than the noise.

When reading tapes into the computer, I found the signal was greatly attenuated before reaching pin 20 on the Sinclair Logic Array. This was caused by the low resistance of R34, shunting it to ground, so I replaced the 210-ohm resistor with a 4700-ohm resistor I call R34A. These changes solved all my tape reliability problems. However, the component values used in these changes may not be the best for your tape recorder but should be a starting place to eliminate the problems.

I was also being bothered by the large TV I was using and the jittery, waving lines displayed on it. I obtained a used monitor and attached it as shown on the schematic, using a single-pole-double-throw switch, a resistor, an NPN transistor and an extra RCA jack. This was a great improvement,but there were still a wavy pattern on the face of the tube, when I was using the 16K add-on memory. It turns out that it was caused by the oscillator in the memory feeding back on the 5-volt power buss. Putting C4A across C4 solved this and now the display is steady as a rock.

Another useful change, mentioned in several articles, is to add a reset switch so that it isn't necessary to pull the 9-volt plug or shut off the DC power to clear the computer when it hangs up. This is shown connected to the junction of R15/C5 and pin 26 of the Z80A, which also goes to the edge connector. This should be a normally-open momentary-contact switch.

This article is reprinted from the newsletter of the Seattle Area Timex/Sinclair Users Group. It combines several hardware improvements to the TS1000 type computers. One modification involves changing the frequency response of the computer to the storage tape recorder. Your optimum frequency response may not be the same as that of the author's.


To Edge Connector
VCC
R15 220K
C5 1uF
Reset Pushbutton
26
CPU
+5V VCC
C4 0.047
C4A 0.10
J A Monitor
J5 TV
Modulator
IXOC
J3 Mic
J4 Ear
R34A 4.7K
C10A 0.10
C11 47pF
R27 1K
R31 390
R32 560
D9 1N4148
C12 47pF
C12A 47pF
R23 1M
R23A 470K
R A 4700
Q A 2N2222
R33 4700
Monitor
TV
20
18
Sinclair ULA
+VCC +5V
Note: Parts with Suffix A are replacements or additions.
ZX-81 Component Changes
Size A
Document Number
REV
Date: December 14, 1980 Sheet 1 of 1

TS2068 TIMING

K5XY

In July a series of articles which included a detailed discussion of the timing used in the TS1000 series of computers was concluded. Therefore this month a short article giving some of the details of the timing of the TS2068 appears.

The Z-80A CPU of the TS2068 operates at a clock frequency of 3.53 MHz. The primary features of this CPU are as follows:

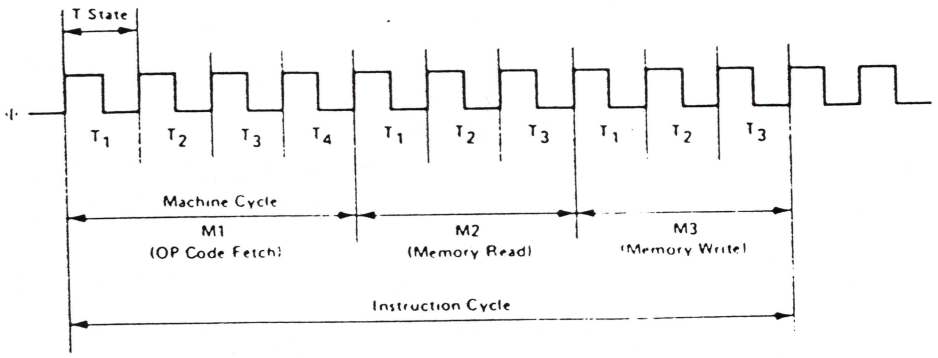
- o 158 instructions
- o Dual register set
- o Two index registers
- o On-chip refresh logic

The Z-80 CPU executes instructions by proceeding through a sequence of operations that include:

- o Instruction Op code fetching
- o READ or WRITE memory
- o READ or WRITE I/O
- o Acknowledge an interruption.

The basic clock period is referred to as a T time or state and three or more T states make up a machine cycle. In the TS2068, each T-time is approximately 283 nanoseconds (2.83×10^{-7} seconds). The figure below illustrates the basic timing.

BASIC CPU TIMING EXAMPLE



SINGLE ELEMENT ANTENNA PROGRAM (for TS1000)

K5XY and WA3QLW

WA3QLW has sent several simple useful ham programs for the TS1000 series of computers. This article is the first of several to be based on these programs. Comments have been added to the bare program to point out some programing techniques or to clarify some point of programing.

The first program helps calculate the length of simple single element antennas when the type of antenna and the frequency are known.

This program starts off by asking for the type of antenna desired. Then it asks for the frequency range to be covered. Lastly it asks for the intervals in that frequency range at which intermediate lengths are to be calculated. Although it is not explicitly stated, the program will only calculate 15 different frequencies at one time. The program does not consider bandwidth of the antenna or the input impedance of the antenna when operated off frequency.

In the program which follows, you might want to systematize the line numbering. Many people make it a practice to start a basic program with line 100 and to increment the line numbers in units of 10.

```
  2 PRINT "SINGLE ELEMENT ANTENNAS"
  4 PRINT "DIPOLES, VERTICALS, ECT"
  6 PRINT "SELECT FOLLOWING"
  7 PRINT "1/4 W PRESS 1"
  8 PRINT "1/2 W PRESS 2"
  9 PRINT '5/8 W PRESS 3"
 10 PRINT "3/4 W PRESS 4"
 12 IF INKEY$ = "" THEN GOTO 12
 13 LET A$ = INKEY$
 15 IF A$ = "1" THEN LET K = 234000
 18 IF A$ = "2" THEN LET K = 468000
 20 IF A$ = "3" THEN LET K = 585000
 25 IF A$ = "4" THEN LET K = 702000
 30 PAUSE 50
 35 CLS
 40 PRINT "INPUT LOWER BAND EDGE IN KHZ"
 50 INPUT F1
 55 PRINT F1
 60 PRINT "INPUT UPPER BAND EDGE IN KHZ"
 70 INPUT F2
 75 PRINT F2
 80 PRINT "INPUT FREQ INCREMENT INKHZ"
 90 INPUT F3
 95 PRINT F3
120 PRINT "ARE ALL ENTRIES OK?  Y/N"
125 IF INKEY$ = "" THEN GOTO 125
130 LET C$ = INKEY$
132 PAUSE 20
135 IF C$ = "Y" THEN GOTO 143
140 IF C$ = "N" THEN GOTO 35
143 CLS
145 FOR X = 1 TO 15
146 LET F = F1
150 LET L = K/F
160 PRINT F1;" KHZ = ";L;" FEET"
170 LET F1 = F1 + F3
180 IF F1 .= F2 + F3 THEN GOTO 300
190 LET X = X + 1
195 IF X <= 15 THEN GOTO 146
200 IF X >= 15 THEN GOTO 386
210 NEXT X
300 PRINT
305 PRINT "ADDITIONAL FREQS OUT OF"
310 PRINT "UPPER RANGE LIMIT"
340 PRINT
345 PRINT "PRESS 1 FOR NEW DESIGN"
350 PRINT "PRESS 2 TO STOP"
355 IF INKEY$ = "" THEN GOTO 355
```

```
360 LET B$ = INKEY$
365 IF B$ = "1" THEN GOTO 375
370 IF B$ = "2" THEN GOTO 390
375 CLS
380 GOTO 6
386 PRINT "MAX CALCULATION LIMIT REACHED"
387 GOTO 340
390 STOP
9998 SAVE "ANt"
9999 GOTO 2
```

Now let us look at a few of the lines in more detail.

The lines from 7 to 25 give you a menu of choices and act on your choice. Line 12 is particularly interesting. It uses a common technique. The INKEY$ command asks for a single character of keyboard input but it does not wait for it. This line repeats itself until a key, any key, is pressed.

Line 13 assignes the INKEY$ value to a variable for use in the program.

Line 35, of course, clears the screen.

Lines 40 to 45 ask for multicharacter input. The program waits for an ENTER before continuing. The program quite properly prints out your input so you can see that the correct values have been entered.

Line 150 is the key to the whole program. It is the line which calculates the desired result. All the other lines just get the data into the program and print the results out.

Lines 145 to 210 are a FOR NEXT loop. More about them later.

The last two lines are a common Sinclair way to semi-automatically save the program once it is typed in. Just command the computer to GOTO 9998.

There are several things, besides improving the output display, that can be done to improve this program. There are two places noted here which you can work on before some suggestions are made next month.

The first has to do with input error checking. When the program requests input in lines 12, 120, and 355 no attempt at error checking is made. Can you create an addition to the program that will reject unexpected input?

The FOR NEXT loop mentioned earlier has a number of ways to exit the loop. What is the purpose of lines 190 to 200. Can you think of other ways to carry out these purposes?

Work out solutions to these questions and compare your answers to the answers which will be given next month.

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73, K5XY

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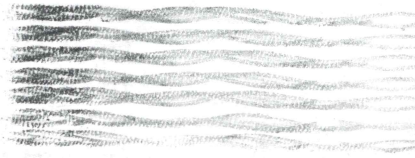

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